MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2024

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

NOVA School of Science and Technology, NOVA University Lisbon

RESEARCH GROUP AND URL

CENIMAT/I3N, https://www.cenimat.fct.unl.pt/

SUPERVISOR (NAME AND E-MAIL)

Luis Pereira, lmnp@fct.unl.pt

SHORT CV OF THE SUPERVISOR

Luis Pereira is an Associate Professor at the School of Science and Technology - NOVA University Lisbon and currently CTO of the AlmaScience Colab. The versatility and initiative demonstrated throughout his scientific career have been very important in building up his expertise in different fields, complementary or distinct from where he began his career. He was involved in the first demonstration of oxide transistors using paper ad dielectric and substrate. This resulted in a family of 14 patents.
He has coordinated and participated in several R& D projects under different funding schemes, including industry direct funding ones. He has been granted in 2015 a Starting Grant of the European Research Council (ERC) on the development of cellulose nanocomposites for paper electronics (New-Fun, project 640598). Recent research interests were on the design and synthesis of 1D, 2D and 3D inorganic and hybrid nanostructures, chiral cellulose nanocomposites, functional micro and nanofibers and their integration on chromogenic, electronic and electrochemical devices. Luis Pereira has published more than 180 papers and has an h-index of 57 with more than 14000 citations (Google Scholar)
In 2020 he became CTO of AlmaScience Colab (https://almascience.pt/) a tech transfer and incubation institution for smart and sustainable solutions based on cellulose and other natural materials. This means that for the last two years, Luis Pereira has been involved in applied research projects led and promoted by industrial partners, highly market-oriented.

5 SELECTED PUBLICATIONS

- Sustainable electrochemical energy storage devices using natural bast fibres, Libu Manjakkal, Amrita Jain, Suman Nandy, Sumita Goswami, José Tiago Carvalho, Luis Pereira, Chan H See, Suresh C Pillai, Richard A Hogg, (2023) Chemical Engineering Journal, 465, 142845
- Alkali-Doped Nanopaper Membranes Applied as a Gate Dielectric in FETs and Logic Gates with an Enhanced Dynamic Response, Diana Gaspar*, Jorge Martins, José Tiago Carvalho, Paul Grey, Rogério Simões, Elvira Fortunato, Rodrigo Martins, and Luís Pereira, (2023) ACS Applied Materials & Interfaces, 15, 6, 8319-8326
- Simone Siccardi, Julia Amici, Samuele Colombi, José Tiago Carvalho, Daniele Versaci, Eliana Quartarone, Luis Pereira, Federico Bella, Carlotta Francia, Silvia Bodoardo, UV-cured self-healing gel polymer electrolyte toward safer room temperature lithium metal batteries (2022) Electrochimica Acta, 433,141265
- Carbon-Yarn-Based Supercapacitors with In Situ Regenerated Cellulose Hydrogel for Sustainable Wearable Electronics, JT Carvalho, I Cunha, J Coelho, E Fortunato, R Martins, L Pereira (2022) ACS Applied Energy Materials 5 (10) 11987-11996
- Reusable cellulose-based hydrogel sticker film applied as gate dielectric in paper electrolyte-gated transistors, I Cunha, R Barras, P Grey, D Gaspar, E Fortunato, R Martins, L Pereira (2017) Advanced Functional Materials 27 (16), 1606755

PROJECT TITLE AND SHORT DESCRIPTION

Nature inspired separators towards sustainable energy storage devices :The aim of this postdoctoral research plan is to contribute to the innovation of battery separators by exploring the potential of cellulose hierarchical structures. This research will focus on developing novel cellulose-based materials with hierarchical architectures for enhanced battery performance, safety, and sustainability. The main research objectives are:

Investigate the design and fabrication of cellulose-based hierarchical structures for battery separators.

Explore various approaches such as electrospinning, templating, self-assembly, and surface modification to create hierarchical architectures.

Optimize the structural parameters, such as pore size, porosity, and interconnectivity, to enhance ion transport and mechanical properties.

Investigate the mechanical strength and thermal stability of cellulose hierarchical structures.

Analyze the structural features, surface morphology, crystallinity, and porosity of the cellulose materials.

Evaluate the electrochemical performance of battery separators with cellulose hierarchical structures.

Evaluate the safety aspects of cellulose-based separators, including their resistance to thermal runaway, prevention of internal short circuits, and impact on battery safety.

Assess the environmental sustainability of cellulose hierarchical structures throughout their life cycle, considering resource extraction, manufacturing, and end-of-life disposal.

SCIENTIFIC AREA WHERE THE PROJECT FITS BEST*

ENG

***Scientific Area where the project fits best** – Please select/indicate the scientific area according to the panel evaluation areas: Chemistry (CHE) • Social Sciences and Humanities (SOC) • Economic Sciences (ECO) • Information Science and Engineering (ENG) • Environment and Geosciences (ENV) • Life Sciences (LIF) • Mathematics (MAT) • Physics (PHY)